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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/933,901      | 08/22/2001  | Minish Mahendra Shah | D-20989             | 7978             |

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EXAMINER

LANGEL, WAYNE A

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1754

DATE MAILED: 09/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

933901

Applicant(s)

Shah et al

Examiner

Langel

Group Art Unit

1754

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- ☐ Responsive to communication(s) filed on \_\_\_\_\_
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- ☒ Claim(s) 1-20 is/are pending in the application.
- ☐ Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- ☒ Claim(s) 1-20 is/are rejected.
- ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- ☐ Claim(s) \_\_\_\_\_ are subject to restriction or election requirement

## Application Papers

- ☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☐ All ☐ Some\* ☐ None of the:
  - ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_
  - ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

\*Certified copies not received: \_\_\_\_\_

## Attachment(s)

- ☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 4
- ☐ Interview Summary, PTO-413
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Other \_\_\_\_\_

Office Action Summary

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The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Keskar et al. in view of Gottzmann et al. '465. Keskar et al. disclose a process for producing synthesis gas and hydrogen by passing a compressed and heated oxygen-containing gas mixture into a reactor having at least one oxygen transport membrane to produce an oxygen permeate, and reacting the separated oxygen with an organic fuel to form synthesis gas. The resulting synthesis gas is separated into hydrogen gas by a hydrogen transport membrane. (See the Abstract and column 3, line 56 - column 4, line 53.) Keskar et al. specifically disclose at column 4, lines 15-18 and column 5, lines 20-28 that the separated oxygen may be reacted with a hydrocarbon in the presence of steam such that partial oxidation and steam reforming reactions occur to form the synthesis gas. Keskar et al. teach at column 4, lines 22-30 that at least a portion of the hydrogen gas is transported across the hydrogen transport membrane to

generate a hydrogen permeate and a hydrogen-depleted synthesis gas. The difference between the process disclosed by Keskar et al., and that recited in applicant's claims, is that Keskar et al. do not disclose that a stream of the hydrogen-depleted synthesis gas should be combusted in the presence of an oxygen-containing feedstream. LaPierre et al. disclose a method for producing hydrogen in a reforming reactor using a hydrocarbon stream and water vapor stream as reactants. The hydrogen produced is purified in a hydrogen separating membrane to form a retentate stream and purified hydrogen stream and a portion of the retentate stream is combusted to provide heat to the reforming reaction or other reactants. (See the Abstract and column 3, line 12 - column 4, line 7.) It would be prima facie obvious from LaPierre et al. to modify the process of Keskar et al. by combusting the hydrogen-depleted synthesis gas referred to at column 4, line 28 of Keskar et al. in the presence of an oxygen-containing feedstream, since LaPierre et al. would suggest that the combustion of such a stream would provide a suitable source of heat for heating reactants, and Keskar et al. disclose at column 13, lines 9 and 10 that the oxygen containing gas mixture should be heated. Applicant's claims do not require that the stream resulting from the step of combusting a stream of the hydrogen-depleted crude synthesis gas in the presence of an oxygen-containing feedstream be employed as the "heated oxygen

containing feedstream" which is fed to the oxygen transport membrane, since the recitation of "to form said heated oxygen-containing feedstream" is in a "thereby" clause, and accordingly is not given patentable weight.

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Keskar et al. in view of LaPierre et al., further in view of Gottzmann et al. '465. Keskar et al. and LaPierre et al. are relied upon as discussed hereinbefore. The difference between the process disclosed by Keskar et al., and that recited in applicant's claims, is that Keskar et al. do not disclose the step of combusting a stream of the hydrogen-depleted crude synthesis gas in the presence of an oxygen-containing feedstream, thereby to form the heated oxygen-containing feedstream. Gottzmann et al. '465 discloses a process for forming methane into synthesis gas through a combination of a partial oxidation reaction and a steam reforming reaction, wherein oxygen for the partial oxidation reaction is obtained by contacting air with an oxygen transport membrane and recovering the oxygen transported through the membrane. The efficiency and cost benefit of the process is enhanced by utilizing in-line combusters to heat gases being delivered to the oxygen transport membrane. (See the Abstract.) Gottzmann et al. '465 teaches at column 3, lines 3-6 that the oxygen containing feed gas is heated in a combuster. It would be prima facie obvious from LaPierre et

al. in view of Gottzmann et al. '465 to modify the process of Keskar et al. by combusting a stream of the hydrogen-depleted crude synthesis gas in the presence of an oxygen-containing feedstream to form the heated oxygen-containing feedstream for the process, since LaPierre et al. suggest that combustion of such a hydrogen-depleted synthesis gas would be a suitable source of heat for other reactants in the process, and Gottzmann et al. '465 specifically disclose that the oxygen containing feed gas should be heated in a combustor. It would be obvious that the oxygen containing feed gas could be heated in a combustor by combustion of the hydrogen-depleted synthesis gas, since one of ordinary skill in the art would recognize that any known or suitable fuel could be used for the combustion.

Claims 1-20 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is indefinite as to whether the stream resulting from the step of "combusting a stream of the hydrogen-depleted crude synthesis gas in the presence of an oxygen-containing feedstream" would constitute the "heated oxygen containing feedstream" which is separated with the oxygen transport membrane, since the recitation of "to form said heated oxygen-containing feedstream" in the last two lines of claim 1 is

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in a "thereby" clause, thus rendering it unclear whether such step is accorded patentable weight.

The other references are made of record for disclosing methods for separating oxygen from an oxygen-containing gas by using an oxygen transport membrane, and using the separated oxygen for partial oxidation of hydrocarbons or in a combined process of partial oxidation and steam reforming of hydrocarbons.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wayne A. Langel whose telephone number is (703) 308-0248. The examiner can normally be reached on Monday through Friday from 8 A.M. to 3:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman, can be reached on (703) 308-3837. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-2351.

WAL:cdc

September 8, 2003

*Wayne A. Langel*  
WAYNE A. LANGEL  
PRIMARY EXAMINER